



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF AGRICULTURAL AND FOOD SCIENCES
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN
ANIMAL SCIENCE, FOOD SECURITY, 3rd YEAR, 2nd SEMESTER
2024/2025 ACADEMIC YEAR

SIAYA CAMPUS

COURSE CODE: APB 1306

STREAM: SOIL SCIENCE

**COURSE TITLE: NUTRIENT MANAGEMENT AND RESEARCH IN AGRO-
ECOSYSTEMS**

Date:

Instructions:

- 1. Answer Question 1 and ANY other TWO questions.**
- 2. Answers to Questions must be written in the Answer Booklets**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION 1

- a) What were the primary challenges in agricultural production before and including 1800 ?
(5 Marks)
- b) Why did Mineral fertilizers become essential for increasing food production in the 20th century?
(5 Marks)
- c) Outline the alternative strategies for maintaining soil fertility in developing regions.
(10 Marks)
- d) Compare food production prospects in Sub-Saharan Africa (SSA) and South Asia.(10 marks)

QUESTION 2

Imagine you are an agricultural policy advisor in a country facing severe soil degradation, low crop yields, and regional disparities in agricultural productivity. Based on the principles of sustainable agriculture and nutrient management, propose a strategic plan outlining three key interventions that could improve soil fertility and crop productivity while ensuring long-term sustainability. Justify how each intervention addresses the specific challenges. (20 marks)

QUESTION 3

Explain the role of essential plant nutrients in plant growth and development. In your answer, discuss the difference between macronutrients and micronutrients, provide examples of each, and describe how nutrient deficiencies affect plant health and productivity. (20 Marks)

QUESTION 4

Using the principles of balanced crop nutrition and integrated nutrient management (INM), justify why an optimal and site-specific nutrient management approach is necessary for sustaining high crop yields. In your response, discuss the role of soil fertility, nutrient balance, and environmental sustainability in optimizing plant nutrition. Provide examples to support your answer.

(20 Marks)

QUESTION 5

- a) Critically analyze the factors influencing the transformation and mobilization of soil nutrients in tropical and temperate regions.
(10 Marks)
- b) How do temperature variations, soil composition, and external nutrient inputs affect the availability of essential nutrients such as nitrogen (N), phosphorus (P), and potassium (K)? Provide relevant examples to support your analysis.
(10 Marks)

